

## (54) IMAGE RECORDING APPARATUS

(11) 2-265749 (A) (43) 30.10.1990 (19) JP  
 (21) Appl. No. 64-86878 (22) 7.4.1989  
 (71) CANON INC (72) TOSHIMITSU DANZUKA(1)  
 (51) Int. Cl. B41J2/01, B41J2/075

**PURPOSE:** To make it possible to obtain always fine image records even in an image recording apparatus wherein recording is conducted by superposing recording agents by implementing operation based on image signals which specify driving conditions of delivery energy generating elements corresponding to each delivery port of recording heads in a region of high gray level, and by making smaller the image signals to specify driving conditions of the elements in response to the result of the operation.

**CONSTITUTION:** An operation unit 12 is an operation processing unit, wherein operation is applied to image signals 11C, 11M, 11Y, whereby signals 13C, 13M, 13Y are outputted therefrom as a result of the operation. And image signal correction unit 14C, 14M, 14Y correct input image signals 11C, 11M, 11Y respectively in response to the signals 13C, 13M, 13Y. In the case of cyanogen, for example, correction of the signal 11C in the input image signal correction unit 14 is made by converting the signal 11C to signal 15C using a look-up table. In the case of a binary printer, wherein input image signal is small, when the number of recorded dots per area is small, no conversion is made and when input image signal becomes larger and number of recorded dots increases in the binary printer, output signal is kept at lower values so that quantities of ink recorded in the boundary area decrease and hence black lines in the region of high gray level are reduced.

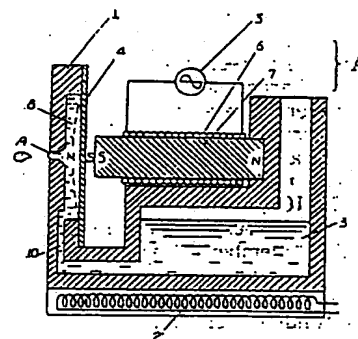
9C, 9M, 9Y: head

## (54) INK-JET HEAD

(11) 2-265751 (A) (43) 30.10.1990 (19) JP  
 (21) Appl. No. 64-86202 (22) 5.4.1989  
 (71) MATSUSHITA ELECTRIC IND CO LTD (72) SEIJI YAMAMORI(4)  
 (51) Int. Cl. B41J2/045, B41J2/015

**PURPOSE:** To prevent the deterioration of transducers due to heat by providing electromagnetic transducers comprising permanent magnet and electromagnet in stead of piezo-electric transducers.

**CONSTITUTION:** At first, a heating means 2 is energized to generate heat so that a head structure member is heated to melt solid ink 3 therein, whereby the melted ink is fed into an ink chamber 8 through an ink passage 10 so that the chamber 8 is filled therewith. After a predetermined period of time, an ink-jet head 1 is kept at a constant temperature by the action of a temperature control circuit, following which a printer starts printing action, while image signal current is applied to a coil 6. The S-pole of a diaphragm 4 and S-pole of a magnetic core 7 repel each other, so that the diaphragm 4 is curved toward the ink chamber 8, whereby an abrupt pressure rise is caused in the chamber 8 with the result that droplets of ink are delivered from an ink nozzle 9. When electric power is put off, the diaphragm 4 restores its original shape, while the ink 3 is supplied to the chamber 8 through the ink passage 10.



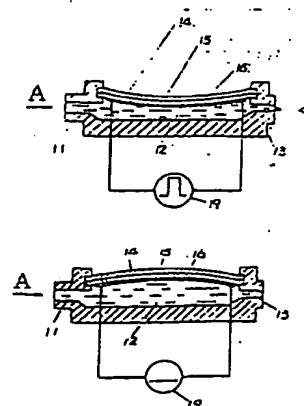
5: signal. A: electromagnet

## (54) INK-JET RECORDING HEAD

(11) 2-265752 (A) (43) 30.10.1990 (19) JP  
 (21) Appl. No. 64-86205 (22) 5.4.1989  
 (71) MATSUSHITA ELECTRIC IND CO LTD (72) HAJIME ODA(4)  
 (51) Int. Cl. B41J2/045, B41J2/05

**PURPOSE:** To dispose a large number of nozzles closely to each other to enable displacement elements for generating pressure of ink to act under low drive voltage by using two shape memory alloy displacement elements which are superposed on each other as displacement elements for generating pressure of ink and providing also a heating or cooling means.

**CONSTITUTION:** When a signal 19 is applied to a heating element 16, a shape memory alloy displacement elements 15 is first heated so as to be displaced toward the side of a pressure chamber 12, whereby the pressure of ink in the chamber 12 rises, thereby causing the ink to be projected in the form of droplets from an ink delivery port 13. And when the signal is cut off, the element 15 is cooled; however, a shape memory alloy displacement element 14 situated outside the element 15 is caused to warp in a direction opposite to the chamber 12 because of its retarded cooling. As a result, the elements restore their original parallel form or conversely they warp slightly outwardly, so that ink is supplied into the chamber 12 from an ink supply port 11.



A: ink